SOUTHERN CALIFORNIA
ASSOCIATION of GOVERNMENTS

Main Office
818 West Seventh Street
12th Floor
Los Angeles, California
90017-3435

t (213) 236-1800
f (213) 236-1825

www.scag.ca.gov

MEETING OF THE

SOLID WASTE TASK FORCE

NOTE CHANGE IN MEETING DATE AND TIME

Tuesday, October 9, 2007

9:00 a.m. – 11:00 a.m.

SCAG Offices
818 West 7th Street, 12th Floor
Conference Room – Riverside A
Los Angeles, CA 90017
213.236.1800

If members of the public wish to review the attachments or have any questions on any of the agenda items, please contact Jacob Lieb at 213.236.1921 or lieb@scag.ca.gov or Christine Fernandez at 213.236.1923 or fernande@scag.ca.gov.

Agendas and Minutes for the Solid Waste Task Force are also available at:

http://www.scag.ca.gov/rcp/solidhazardouswaste.htm

SCAG, in accordance with the Americans with Disabilities Act (ADA), will accommodate persons who require a modification of accommodation in order to participate in this meeting. If you require such assistance, please contact SCAG at (213) 236-1868 at least 72 hours in advance of the meeting to enable SCAG to make reasonable arrangements. To request documents related to this document in an alternative format, please contact (213) 236-1868.

SOLID WASTE TASK FORCE

AGENDA

PAGE # TIME

"Any item listed on the agenda (action or information) may be acted upon at the discretion of the Committee."

1.0 CALL TO ORDER & PLEDGE OF ALLEGIANCE — **Hon. Toni Young, Chair**

2.0 PUBLIC COMMENT PERIOD

Members of the public desiring to speak on an agenda item or items not on the agenda, but within the purview of the Committee, must fill out and present a speaker's card to the Assistant prior to speaking. A speaker's card must be turned in before the meeting is called to order. Comments will be limited to three minutes. The chair may limit the total time for all comments to twenty (20) minutes.

3.0 REVIEW and PRIORITIZE AGENDA ITEMS

4.0 CONSENT CALENDAR

4.1 **Approval Item**

4.2 **Receive and File**

4.2.1 Membership List with Contact Information
Attachment

5.0 INFORMATION ITEMS

5.1 RCP Solid Waste Chapter — Christine Fernandez, **SCAG Staff**
Attachment
A revised version of the draft solid waste chapter will be presented for comments and input before finalizing draft chapter.

6.0 CHAIR'S REPORT — **Hon. Toni Young, Chair**

AGENDA

PAGE # TIME

7.0 FUTURE AGENDA ITEMS

Any Committee members or staff desiring to place items on a future agenda may make such request.

8.0 ANNOUNCEMENTS

9.0 ADJOURNMENT

The next meeting of the Solid Waste Task Force will be held on Wednesday, October 24, 2007 in the SCAG offices in downtown Los Angeles.

Solid Waste

This RCP chapter is meant to take a close look at some of the challenges in solid waste management that our region is facing. It will provide a framework for taking the first steps toward a solution. Because this will be an ongoing process, there are some issues – such as hazardous waste, that have not been specifically addressed. However, it is implied that many of the policies described for solid waste management will also apply to management of hazardous wastes.

Note: Much of "The Challenge" section is under discussion with the Solid Waste Task Force. The following represents an interim approach to address the comments received to date but are not necessarily representive of the revisions that will result from the Task Force meeting on October 9.

THE CHALLENGE

Waste comes from homes, businesses, and industrial enterprises. Between 1995 and 2005, our region disposed of approximately 33 million tons of municipal solid waste (MSW) into local landfills each year[1]. The average resident disposes of approximately 2.5 pounds of trash a day[2] while non-residential disposal adds up to 1.2 pounds disposed for every $10 of sales receipts[3]. Although we have made great strides in reducing per capita generation – in 1990, residential disposal was estimated at 3.1 pounds per day, existing landfills will not be enough to accommodate our ever-growing population. There are currently 18 million people in our region with a projected increase of XX% by 2035.

Traditional solid waste management strategies have relied heavily on creating high capacity, regional landfills (megafills) and, to a lesser extent in California, incineration technologies to address disposal issues. But, due to health and environmental concerns it has become increasingly difficult to site, open, and operate new disposal facilities. Federal, State, and local zoning regulations restrict the number or sites suitable forl development. These include restrictions in areas with unstable soils and terrain, landslide-susceptible areas, fault areas, seismic impact zones, land near airports, and land in 100 year flood plains. Potential landfill sites must consider migration control of leachate and methane, soil type to provide a firm foundation, hydrologic settings that will affect landfill layout and drainage characteristics, and a host of other factors. In addition, local public opinion plays a big role when landfills are being sited [4,5,6].

Dwindling landfill capacity and increasing health and environmental concerns have forced both the region and the state to make concerted efforts at developing other waste management methods including reducing the amount of waste that goes into landfills. As landfill space decreases, the costs for landfilling our garbage will continue to increase, ultimately being passed on to residents and businesses in the form of higher disposal fees and eventually, in conspicuous impacts to public health and the environment.

However, overflowing landfills are only a symptom of a bigger problem — the mismanagement of our natural resources. The result of this mismanagement is evident in the mountains of garbage that we produce and the associated health and environmental impacts that result. For example, to obtain the resources used in the manufacturing and production of many of the goods that we use everyday, the mining industry moves an estimated 28 billion tons of soil and rocks each year (globally)[7]. A 1999 study puts this figure at 48.9 billion tons when biomass extraction is included and 8.2 tons per capita average global resource consumption. When broken down

by country, figures show that on a per capita level, extraction of raw materials increases with development status[8].

The goods produced from these resources are usually single-use products that we effortlessly replace or throw away. In the meantime, mining leaves behind a wake of destructive impacts. From threatening local and global biological diversity through habitat destruction to increased chemical contamination, erosion, and silting of lakes and streams to toxic air pollution containing arsenic and lead emissions[9]. Natural resource extraction of the degree seen today has already created health and environmental impacts that will last long into future generations. There is an inextricable link between our current level of resource consumption, the waste we produce, and many environmental problems. Resource extraction and related activities are also large contributors to greenhouse gas emissions, air quality and water quality problems, and energy consumption.

THE PLAN

We will need a combination of both short and long term solutions to effectively address our overwhelming waste problem. In the short term, we will still need to rely heavily on landfills and, when local facilities have filled to capacity, exporting our waste to other areas. In the long term, we will need to change the way we think about trash and move towards a system of waste prevention and minimization. The move towards this system – a Zero Waste system – will take time and require a variety of waste management strategies.

Strategies for Waste Management

Landfills today are technically sophisticated, highly regulated, and closely monitored by many local and state agencies. Methane and leachate collection systems are installed in many facilities and state-of-the-art leachate[10] barriers (landfill liners) are required under current regulations. However, even our current level of technology is not 100% effective in preventing fugitive emissions and, as with anything man-made, landfill liner and collection systems are still prone to failure. Landfill emissions are a

Air quality, GHG emissions, and Water – MAY BE DELETED (depending on solid waste task force)

Landfill emissions are mainly composed of (1) gases, such as methane, carbon dioxide, and a small fraction of volatile organic compounds (VOCs) and (2) toxic leachate (garbage juice). The typical composition of landfill gas is 45-60% methane, 40-60% CO_2, 2-5% N_2, and a small percentage of a variety of other gases, including hydrogen sulfide and carcinogenic VOCs such as benzene, toluene, xylene, and vinyl chloride (ASTDR, 2001). Many VOCs also react with nitrogen oxides (NOx) in the air to create ground-level ozone and smog. Landfilling activities and truck traffic throw dust and particulate matter into the air.

Landfills are a major contributor of greenhouse gases. Worldwide, landfills account for 25% of human-made methane emissions. Methane is a more potent greenhouse gas than carbon dioxide; it has approximately 21 times the global warming potential than CO_2 (EPA, 2007).

Landfill leachate also poses a potential threat to groundwater aquifers. Once leachate contaminates an aquifer, it is very difficult to cleanse the aquifer of the pollution. The aquifer can no longer be considered reliable for human consumption (Lee, 1994). Since landfill liners will eventually leak, future generations may have to deal with Superfund-type[3] groundwater remediation from landfill leachate pollution in groundwater.

major source of greenhouse gases, can aggravate air quality problems, and pose a threat to groundwater aquifers. According to the EPA, "the more reasonable assumption, based on known pressures placed on liners over time, is that any landfill liner will begin to leak eventually[11]."

Concerns have also been raised about the health and safety hazards that landfills pose. These hazards can range from landfill emissions, pests (insects, rodents, vermin), and unpleasant and possibly toxic odors to dust from truck and waste dumping activities, noise from landfill operations, and increased truck traffic[12, 13]. However, many landfills employ extensive environmental control systems to minimize any threats to public health and safety.

Landfills fill a need today and will continue to be needed well into the future. Even as we employ all waste prevention, recycling, reuse, composting, conversion technology, and other waste management strategies, there will always be some inefficiencies in the system and therefore, waste, that will need to be disposed to a landfill. The challenge will be to change our ideas of resource consumption and waste and to begin to think of disposal to landfills as the last resort in waste management. Many of today's health and environmental concerns will become less of a problem as we reduce our garbage volume and become more selective about what we consider trash.

~~One of the most tangible effects of landfills is the number of health complaints caused by odors. Many people living near landfills complain of, nausea, headaches, increased respiratory symptoms, sleeplessness, and psychological[4] problems (ASTDR, 2001). Researchers have attempted to link landfill odors and gas emissions with increased risks of birth defects and cancer, but studies have so far proved inconclusive.~~

~~**Water quality hazard**~~

~~The affect of MSW leachate on public health is not well-studied. A review of studies on the relationship of health and landfill proximity has shown little correlation with epidemiological patterns. However, there are well over 65,000 chemicals in US commerce with 1,000 new chemicals being added each year and only about 200 are regulated and measured in studies of landfill leachate contamination (Lee, 1994). Currently, there are approximately 75,000 toxic chemicals in the EPA's TSCA inventory (EPA, 2006).~~

Exporting Trash

Shrinking landfill capacity is forcing us to transport waste to more distant landfills. A prime example of this is the planned Waste-By-Rail system for Los Angeles County. The system is designed to address the projected shortfall of disposal capacity in Los Angeles County by transporting post-recycled waste to an out-of-county landfill. The rail system will have multiple starting points at large-scale materials recovery facilities throughout Los Angeles County. At these sites waste will be loaded into shipping containers ("intermodal containers") and delivered to the rail loading station (the "intermodal facility") by truck[14]. The rail system will use existing rail lines to transport the waste to Mesquite Regional Landfill, located in Imperial County approximately 35 miles east of Brawley. The landfill is nearing the final stages of construction and is expected to be operational by 2009. Upon completion, the facility will cover 2,290 acres. It is permitted to accept up to 20,000 tons of waste per day from L.A. County and 1,000 tons per day from Imperial, with a maximum capacity of 600 million tons of solid waste over a 100 year lifespan[15,16]. The development of this waste-by-rail system is a direct result of the collaborative effort of local and

county public officials that have provided extensive input into the system. Although exporting waste is not a preferred waste management option, it is a necessary strategy for ensuring the County has a place to dispose of the garbage generated by County residents and businesses.

Unlike other states, California does a good job of keeping waste within its borders. Only 1% of waste generated in California is exported out of state. In the SCAG region, less than 1% of our waste is exported outside of the region[17].

Diverting Garbage Away from Landfills

In 1989, the legislature passed the California Integrated Waste Management Act (AB 939)[18]. This bill mandated a 50% solid waste diversion[19] rate by the year 2000 for all waste management jurisdictions in California. Since then, Californians have done a great job in reducing the amount of waste sent to landfills. Although not all individual jurisdictions have managed to achieve the 50% diversion rate, all jurisdictions are making good-faith efforts to comply with the mandate. The estimated diversion rate for California in 2006 is 54%. This diversion rate translates to 50.1 million metric tons of waste (out of 92.2 million metric tons of waste generated) that avoided disposal to landfills [20].

[GRAPHIC: Material classes from CA's overall waste stream, 2003]

In California, the waste stream is composed primarily of, by volume, organic (food) waste, paper products, and construction and demolition debris. But harder-to-decompose items such as plastic, glass, metal, electronic, and hazardous wastes are also present in the waste stream in significant amounts. (see Figure X.X).

Reuse and Recycling

California hosts approximately 5300 recycling and reuse establishments, employing 84,000 people and generating an annual payroll of $2.2 billion with $14.2 billion in annual revenues[21]. However, California's recycling market is still on shaky ground, especially because of competition from foreign recycling markets. Many countries will pay a premium for our recyclables because they lack their own natural resources. In an effort to support recycling the

Economic Benefits of Diversion

Diversion activities create jobs, add revenue, and help stimulate many economic sectors. Some employment opportunities created by these activities include government and private staffed collectors, recyclable material wholesalers, compost and miscellaneous organics producers, materials recovery facilities, glass container manufacturing plants, plastics converters, and retail used merchandise sales. A 2001 report released by UC Berkeley stated that, "diverting solid waste has a significantly higher (positive) impact on the economy than disposing it." Diversion also helps communities save money by avoiding payment of tipping fees[6] on each ton of waste disposed. The UC Berkeley study estimated that statewide economic impacts from disposal and diversion at 1999 rates were approximately 17 to 20 percent higher than the impacts if all the waste had been disposed (Goldman and Ogishi, 2001). This is because reuse and recycling are inherently value-adding, whereas disposal is not; and value-adding processes support jobs and economic activity (REI, 2001).

Table X.X. Economic Impacts of 1999 Waste Generation Going to Disposal or Disposal and Diversion

Region		Estimated Final Sales 1999 (billions of dollars)	Impact on Economy			
			Output[b] (billions of dollars)	Total Income[c] (billions of dollars)	Value Added[d] (billions of dollars)	Number of jobs created
All California	Disposal only	7.5	18.0	6.8	9.0	154, 000
	Disposal and Diversion	9.2	21.2	7.9	10.7	179,000
Southern California[a]	Disposal only	4.1	9.6	3.6	4.7	82,000
	Disposal and Diversion	5.1	11.3	4.2	5.6	95,000

Table adapted from Goldman, G. and A. Ogishi, 2001. The Economic Impact of Waste Disposal and Diversion in California. A Report to the California Integrated Waste Management Board.

[a] Southern California region includes all six SCAG region counties plus San Diego County.

[b] Output impact is a measure of how the disposal sectors influence total sector sales in the economy.

[c] Income impact measures income attributed to disposal-related economic sectors.

[d] Value added is the increase in the value of goods and services sold by all sectors of the economy.

local recycling industry, the Integrated Waste Management Board has developed the Recycling Market Development Zone (RMDZ) program. The program provides loans, technical assistance, and free product marketing to businesses that use materials from the waste stream to manufacture their products.

There are numerous benefits to recycling and reuse programs. Reuse and recycling reduce the need for landfilling and prevent pollution caused by the manufacturing of products from virgin materials. They help conserve natural resources (timber, water, minerals); sustain the environment for future generations; save energy and avoid fossil fuel use from extractive industries; decrease emission of GHGs that contribute to global climate change, protects; and expand U.S. manufacturing jobs and increases U.S. competitiveness[22]. A 1994 Tellus Institute study showed that with the exception of aggregate materials for road base, many materials show energy savings by using recycled instead of virgin materials. The range of differences in energy saved varies greatly. At the high end is aluminum for which the difference in virgin versus secondary production is 142.68 MMBtu per ton of intermediate product (i.e., it takes 142.68 MMBtu per ton more to process aluminum from raw ore than it does to process the same product from recyclables). At the low end is molten glass for which the energy difference is only 1.54 MMBtu per ton of product[23]. A more recent study from ALCOA has shown that it takes 95% less energy to recycle aluminum than to create it from raw materials[24].

GRAPHIC: Simplified Life cycle of products (recycled and raw materials)

GRAPHIC: R,R,R Waste Heirarchy

Construction and Demolition (C&D) Debris

Construction and demolition debris comprises 21.7% of California's overall disposed waste stream. This equates to approximately 8.7 million tons of C&D debris disposed to landfill. Lumber debris makes up half of that figure, followed by concrete, asphalt roofing, gypsum board, and composite/remainder C&D[25].

Addressing C&D waste prevention can be as simple as using best practices during construction such as advanced framing, double checking measurements to reduce sizing mistakes, and using durable materials that need less frequent replacement [26]. It also means using green building design principles to maximize the use of remanufactured, recycled, or more efficient materials or materials that are designed to be replaced in a modular manner. Unlike demolition waste, up to 80% of construction waste is reusable or recyclable[27].

Cities are starting to institute green building ordinances that require maximum recycling of C&D debris for many types of new construction. There are no statewide

requirements for green building or C&D recycling ordinances. Currently, each city can develop its own requirements; defining the size, cost, and type of project that is subject to C&D recycling as well as, the amount of material recycling required can differ a great deal from city to city. This poses a difficulty for construction companies that do business in many cities.

Food Waste, Organics, and Composting

Californians throw away more than 5 million tons of food scraps each year. Food waste makes up 14% of California's waste stream. This includes all food being disposed by residences, businesses, schools, prisons, and other institutions. Green material collection programs have been implemented in many cities and counties, but not until recently has collection of food scraps been considered. Management of food scraps provides additional opportunities to help meet the State's diversion goals as well as provide greater uses for this resource. The CIWMB suggests the following order for food scrap management: (1) prevent food waste, (2) feed people, (3) convert to animal feed and/or rendering, and (4) compost. Large events and venues, public facilities (e.g., public agency and school cafeterias), and private business such as restaurants and grocery stores could all be targeted for food waste diversion activities[28].

Decomposition of food waste and other organics are a major source of greenhouse gas emissions from landfills. Organic waste comprises 30% of waste disposed to landfills. That figure includes food scraps, textiles, composite organics, and green material like landscape and tree trimmings, grass clippings, and agricultural residues. Diverting organic wastes to composting prevents the production of methane, which is produced during decomposition under anaerobic (oxygen-lacking) conditions. Although composting has its own set of environmental concerns, primarily odor complaints, advancements in composting technologies are able to overcome these problems. Composting has many environmental benefits. In addition to reducing landfill volume and emissions by diverting organic waste, compost can be used to enhance garden and agricultural soils, as landfill cover, in wetland construction, for erosion control, and in land/stream reclamation projects.

Conversion Technologies

Conversion technologies (CTs) refer to a diverse set of processes used to convert waste products into high-value goods such as industrial chemicals or gas, liquid, and solid fuels. Fuel products can be burned to produce energy or refined for higher quality uses to make a variety of industrial products[29]. The attraction of CTs is their ability to convert landfill waste into products that can take the place of fossil fuels mined from natural resources.

CTs target *post-recycled* municipal solid waste residuals currently destined for disposal as their feedstock. That is, before waste is sent to a CT facility, it is sorted to make certain recyclables are removed and collected. Many CT proponents feel CTs with recycling offer a much better alternative than incineration or disposal to landfill.

A study conducted for CIWMB compared a life cycle analysis of landfills (with various stages of landfill gas collection), waste to energy (WTE) combustion (incineration), and hypothetical conversion technologies. It was found that the hypothetical CT scenario could potentially have a two times lower net energy consumption when compared to the incineration scenario and up to 11 times lower than landfill without energy recovery. The CT scenario included energy savings (10-20% of the total net energy savings) from additional materials recycling prior to

conversion and the offsets associated with the prevention of extraction and production of virgin materials [30]. However, the environmental benefits of conversion technology scenarios are highly dependent on their ability to achieve high conversion efficiencies and high materials recycling rates.

The best feedstock for CTs are carbon-rich items such as sewage sludge, plastics, tires, agricultural waste, wood, and other paper products. This raises concerns that CTs could potentially discourage recycling. It is therefore important that issues such as these be addressed to properly integrate a CT facility into the zero waste strategy. All conversion technologies will produce a small amount of solid residue that will need to be disposed in landfills. The public health impacts of conversion technologies are still being assessed, but CTs with appropriate controls and emissions technology produce lower emissions of criteria air pollutants (NO_x and SO_x) and CO_2 than landfills[31].

At the current time, conversion technologies are considered ineligible as a diversion strategy and the permitting and siting of CT facilities has been met with opposition partly due to the concerns mentioned above. In the eye of the Integrated Waste Management Board, there is a high level of uncertainty regarding the environmental performance of CTs. Conversion technologies have been around for decades, but it is only recently that their applicability to solid waste management has begun to be fully developed. However, the successful development and use of CTs is already occurring in Japan, Germany, and the UK. It should be noted that conversion technologies are not the definitive answer to the overflowing waste problem. Rather, like waste-to rail initiatives, they are only a part of the solution as we move forward toward a Zero Waste system.

Two main types of conversion technologies are being developed for management of solid waste – thermochemical conversion and biochemical conversion.

- Thermochemical conversion is characterized by processes that use high temperatures to achieve high conversion rates of dry, organic material. These processes include gasification, pyrolysis, plasma arc, and catalytic cracking. *Advanced thermal conversion (advanced thermal recycling) primarily refer to technologies that employ only pyrolysis and/or gasification to process municipal solid waste* [32]. The primary products of thermochemical conversion technologies include: fuel gas (syngas - CO_2, CO, CH_4, H_2), heat, liquid fuel, char, and ash[33].
- Biochemical conversion processes use lower temperatures than thermochemical conversion and have lower reaction rates. These processes are focused on the conversion of biodegradable organics found in MSW residue into high energy products. The products of bioconversion are biogas (CH_4 and CO_2), biofuel (ethanol, biodiesel, fuel oil, etc.), and residue that can be used for compost. Biogas usually has less energy (Btu/ft^3) than syngas produced by thermal conversion systems[34]. Non-biodegradable organic feedstocks, such as most plastics, are not convertible by biochemical processes.

The Zero Waste Strategy

In the last 10-15 years there has been a strong movement to recognize the inextricable link between the waste we generate and our consumption of natural resources. Today's economy is based on the extraction of "cheap" resources to make products that are largely designed to end up in landfills. Waste is a reflection of our inefficient use and mismanaged consumption of finite, natural

resources. The Zero Waste movement is an attempt to redefine the waste paradigm and bridge the gap between waste and consumption.

> ~~"At the heart of the concept of sustainability is a fundamental, immutable value set that is best stated as 'parallel care and respect for the ecosystem and for the people within'. From this value set emerges the goal of sustainability: to achieve human and ecosystem well-being together. It follows that the 'result' against which the success of any project or design should be judged is the achievement of, or the contribution to, human and ecosystem well-being together. Seen in this way, the concept of sustainability is much more than environmental protection in another guise. It is a positive concept that has as much to do with achieving well-being for people and ecosystems as it has to do with reducing stress or impacts." (Tisdell, 1988)~~ MOVE TO SUSTAINABILITY DISCUSSION – Chap 1

The Zero Waste paradigm builds on all the waste diversion strategies that were previously discussed. The three Rs of waste management – Reduce, Reuse, Recycle – still hold true, but with the emphasis placed on the first R. It goes beyond current waste diversion strategies by addressing waste elimination at the source and distributing the responsibility for waste on both the consumer and the producer. Instead of managing just the end results of our consumption-related activities (trash), we focus on resource conservation and management. The aim is to create a whole system approach to the way materials flow through society, where all discarded materials are resources for others to use and resource conservation and recovery is built into every process. Zero Waste means designing and managing products and processes to reduce impacts to the environment, volume and toxicity of waste and materials, and waste of natural resources, as well as managing materials flow to prevent the creation of un-recyclable products. We can probably never achieve 100% materials efficiency but, "we can get darn close!"[35]

© Eco-Cycle 2005. Contact Eco-Cycle to use graphics and/or text. [GRAPHIC: Zero Waste Materials Flow – example above]

SIDE BAR: Life Cycle Assessments (Analyses)

Life Cycle Assessments (LCAs) need not be limited to analyzing the life cycle of a single product. LCA is a methodology that can analyze the interactions of a technological system with the environment. It can be used as a decision-making tool to help weigh environmental and health impacts between various waste management options. If used correctly,[9] LCAs can answer questions like, "Are impacts from manufacturing aluminum cans from raw material really much worse than the impacts from re-manufacturing of recycled aluminum and if so, how much worse?" and "Have the costs of environmental and health impacts, such as losing ecosystem services[10] and the loss of worker days been calculated into the costs?" Governments, private firms, consumer organizations, and environmental groups can all use LCA as a decision support tool (Tan and Culaba, 2002).

SIDEBAR: List of Zero Waste communities

Many communities in (and out) of the SCAG region are already aiming for Zero Waste!

- City of Los Angeles: 70% diversion by 2020; 90% by 2025 (RENEW LA Plan; Zero Waste Plan)
- City of Santa Monica: 70% diversion by 2010; (In Sustainable City Plan)
- City of Oakland: 75% diversion by 2010; Zero Waste by 2020.
- City of Pasadena: Zero Waste by 2040 (In Green City Action Plan).
- Culver City (In Sustainable Community Plan)
- State of California, Integrated Waste Management Board (Zero Waste California)
- Rancho Cucamonga
- San Bernardino Zero Waste Communities
- San Francisco City and County
- Berkeley: 75% 2010; Zero Waste 2020.
- New Zealand adopted ZW as a goal

Zero Waste promotes strategies that look at the entire product life cycle to assess the true economic, environmental, and health-related costs of manufacturing a product. Life cycle assessments[36] (LCAs) attempt to appraise all the inputs and outputs that are associated with the creation and disposal of a product. Included are the direct inputs to the production process, associated wastes and emissions, and the future (downstream) fate of the product.

Through LCAs and similar applications, a sustainable, economic market can be created by developing more efficient systems that minimize the need for virgin materials and maximize the use of materials already available. By evaluating the existing materials flowing through a community, we can identify opportunities to take what one business considers a byproduct or waste and provide that material to another business that can use it as a production feedstock or input. This is good policy for the region as existing businesses can save money by creating efficiencies in production[37].

The 2004 Growth Vision recognized this and stated that "management of solid waste (and hazardous waste) must be sustainable in order to efficiently manage natural resources and in order to protect the environment today and in the future."

Product Stewardship and Extended Producer Responsibility

Zero Waste requires that we change the current waste management hierarchy to one that focuses on product stewardship and extended producer responsibility principles because one of the most effective ways to manage waste is to prevent it from being produced in the first place.

Product stewardship is a product-centered approach to environmental protection. It extends the responsibility for a product to everyone involved in the product lifecycle (EPA, 2007b). This means that manufacturers and producers design products that are recyclable, reusable, less toxic, less wasteful, and/or more durable. Retailers and consumers are then responsible for ensuring that proper recycling and disposal of products occur.

Product stewardship is often used interchangeably with Extended Producer Responsibility (EPR). However, EPR focuses the brunt of the responsibility for creating an environmentally compatible product on the manufacturers and producers of the product. Producers retain responsibility for their end-of-life (EOL) products. This provides them with incentives for designing products for recycling, reuse and easy dismantling.[38]. For example, businesses making products that are leased, such as HP (photocopiers) have long known that their products will be returned so they have learned to make remanufacturing profitable. When businesses are compelled to internalize the true costs of wasteful packaging and inefficient material use, there is incentive to create more efficient waste management strategies.

EPR policies should give producers an incentive to design products that:

- use fewer natural resources;
- use greater amounts of recyclate in the manufacture of the product;
- can be reused;
- can be more easily treated/dismantled and recycled;
- reduce or eliminate the use of hazardous substances or materials in the manufacture of a product.

The long-term purpose of EPR is to encourage more environmentally friendly product development—products that require fewer resources, are easier to reuse/recycle, and which contain fewer environmentally dangerous substances (Strenström and Ritchey, 2004). The concept promotes a more sustainable approach to resource use and a reduction in the quantity of waste going to a landfill, by diverting end of life products to re-use, recycling, or other forms of recovery. Many corporations are recognizing the value of EPR and have developed voluntary EPR strategies in their organizations.

Voluntary examples of EPR in U.S.

Xerox's Asset Recycling Management Program – a model EPR program which has led to extensive product redesign. The program has generated substantial profits by maximizing recovery of the residual value of office equipment, which the company takes back at the end of its useful life.

Kodak's take-back and recycling program for single-use cameras has had marketing benefits in helping to dispel these products' image as throwaway items that quickly end up in the landfill.

Interface, a global carpet company, has a program to lease carpet and recycle it at the end of its life. DuPont, 3M, Milliken and Collins & Aikman are also taking back and recycling carpeting.

The Solid Waste Action Plan

All of the strategies that have been laid out are meant to provide guidance and background for implementing the action plan that follows. The goal attempts to encapsulate the vision for solid waste and resource management that will move our region toward a more sustainable and healthier future. This will require a coordinated effort of implementing all of the short-term and long-term policies/actions that are contained within this plan. Some,

of which require changing how our whole region thinks about solid waste management issues.

We will need to employ a mix of waste management strategies as we move towards a Zero Waste region. Recycling, composting, conversion technologies, and landfills all play a part in moving towards a Zero Waste region. We will need to employ this mix of strategies to handle current waste disposal needs as we transition to a system of real natural resource management. Even if we achieve close to 100% materials efficiency, there will still be residual waste that will need to be landfilled or managed with conversion technologies.

SOLID WASTE GOALS

- A Zero Waste[11] region that conserves our natural resources, reduces our reliance on landfills, and creates new economic opportunities in the most environmentally responsible manner possible.

SOLID WASTE OUTCOMES

- All SCAG region jurisdictions should meet a 30% waste disposal rate by 2035 to minimize disposal to landfill providing appropriate employment of technologies are permitted and diversion credit is provided by the State for waste management strategies including, but not limited to, appropriate and environmentally sound recycling, composting, and conversion technology facilities as well as other actions and strategies contained in this chapter, such as product stewardship and extended producer responsibility.
- Conversion technologies should be available as a diversion strategy in the next five years with one or more new conversion technology facilities sited in the SCAG region by 2020.

SOLID WASTE ACTION PLAN

IGR/Best Practices	Legislation	Coordination	Constrained Policies	Potential for Direct/Indirect Benefits									Other Benefits		
				Land Use and Housing	Transportation	Air Quality	Water	Energy	Open Space and Habitat	Economy	Security and Emergency Preparedness	Solid Waste	Public Health	Environmental Justice	Climate Change
SCAG Policies															
	x		SW-1 SCAG shall encourage all levels of government to advocate for source reduction and waste prevention.	x	x	x	x	x	x	x		x	x	x	x
x			SW-2 SCAG shall encourage policies that: (a) promote the expansion of recycling programs and facilities that provide local recycling services to the public and private sectors; and (b) encourage the development of viable, local, and sustainable markets to divert materials from landfills (e.g., recycling markets).	x	x	x	x	x	x	x		x	x	x	x
		x	SW-3 SCAG shall adopt and implement "green" procurement policies and participate in programs that promote the purchase of recycled content products		x	x	x	x	x	x		x	x		x
	x		SW-4 SCAG shall support and encourage the CIWMB to conduct comprehensive life cycle assessments of **all** components of the waste management practices including but not limited to, waste disposal to landfills, composting, recycling, and conversion technologies. A comprehensive analysis must include environmental impacts, health effects, emissions, use of resources and personnel,		x	x	x	x	x			x	?	?	?

IGR/Best Practices	Legislation	Coordination	Constrained Policies	Potential for Direct/Indirect Benefits									Other Benefits		
				Land Use and Housing	Transportation	Air Quality	Water	Energy	Open Space and Habitat	Economy	Security and Emergency Preparedness	Solid Waste	Public Health	Environmental Justice	Climate Change
			costs of same to collect wastes and recyclables, transportation costs (local, within U.S. or international), process to separate recyclables, and production of end products using collected recycled materials.												
	x		SW-5 SCAG shall continue to support and encourage legislation that advocate for the elimination of unnecessary duplication and/or restrictive regulations that hinder recycling, reuse, composting and conversion of solid waste and redefines conversion technologies as a diversion strategy to allow development of these facilities in the SCAG region.	x	x	x	x	x	x	x		x	x	x	x
		x	SW-6 SCAG should coordinate region-wide initiatives on source reduction, reuse, recycling, composting, and conversion technology to increase economies of scale.	x	x	x	x	x	x	x		x	x	x	x
x			SW-7 SCAG should encourage the equal distribution of industrial impacts among all income levels from all types of solid waste management facilities including recycling, composting, and conversion technology facilities.	x	x	x	x	x	x	x		x	x	x	x
		x	SW-8 SCAG shall support the development of public education and outreach efforts to increase awareness of the benefits of a	x	x	x	x	x	x	x		x	x	x	x

IGR/Best Practices	Legislation	Coordination	Constrained Policies	Potential for Direct/Indirect Benefits									Other Benefits		
				Land Use and Housing	Transportation	Air Quality	Water	Energy	Open Space and Habitat	Economy	Security and Emergency Preparedness	Solid Waste	Public Health	Environmental Justice	Climate Change
			regional zero waste policy.												
Local Government Policies															
x			SW-9 Local governments should update general plans to reflect solid waste sustainability issues such as waste reduction goals and programs (1996 RCP; 135).	x	x	x	x	x	x	x		x	x	x	x
x			SW-10 Local governments should discourage the siting of new landfills unless all other waste reduction and prevention actions have been fully explored. If landfill siting or expansion is necessary, landfills should be sited with an adequate landfill-owned, undeveloped land buffer to dilute the adverse impacts of the landfill in neighboring communities.	x	x	x	x	x	x	x		x	x	x	x
x			SW-11 Local governments should discourage exporting of locally generated waste outside of the SCAG region. Disposal within the county where the waste originates shall be encouraged as much as possible. Green technologies for long-distance transport of waste (e.g., clean engines and clean locomotives or electric rail for waste-by-rail disposal systems) should be given primary consideration.	x	x	x	x	x	x	x		x	x	x	x
		x	SW-12 Local governments should adopt Zero Waste goals and practices and look for	x	x	x	x	x	x	x		x	x	x	x

IGR/Best Practices	Legislation	Coordination	Constrained Policies	Potential for Direct/Indirect Benefits									Other Benefits		
				Land Use and Housing	Transportation	Air Quality	Water	Energy	Open Space and Habitat	Economy	Security and Emergency Preparedness	Solid Waste	Public Health	Environmental Justice	Climate Change
			opportunities for voluntary actions to exceed the 50% waste diversion target.												
		x	SW-13 Build local markets for waste prevention, reduction, and recycling practices.	x	x	x	x	x	x	x		x	x	x	x
	x		SW-14 Local governments should adopt and implement green building ordinances that: (a) help divert construction and demolition debris from landfills and (b) encourage the use/reuse of recycled/reusable materials in construction projects. *The ordinance should require the inclusion of a waste management plan that promotes maximum reuse and recycling of construction and demolition debris in construction contracts.*	x	x	x	x	x	x	x		x	x	x	x
	x		SW-15 Local governments should develop ordinances that promote waste prevention and recycling such as: requiring waste prevention and recycling efforts at all large events and venues; implementing recycled content procurement programs; and instituting ordinances to divert food waste away from landfills and toward food banks and composting facilities.		x	x	x	x	x	x		x	x	x	x
x			SW-16 Support environmentally friendly alternative waste management strategies such as composting and conversion technologies.	x	x	x	x	x	x	x		x	x	x	x

IGR/Best Practices	Legislation	Coordination	Constrained Policies	Potential for Direct/Indirect Benefits									Other Benefits		
				Land Use and Housing	Transportation	Air Quality	Water	Energy	Open Space and Habitat	Economy	Security and Emergency Preparedness	Solid Waste	Public Health	Environmental Justice	Climate Change
x			SW-17 Developers and local governments should develop and site composting, recycling, and conversion technology facilities that are environmentally friendly and have minimum environmental and health impacts.	x	x	x	x	x	x			x	x	x	x
		x	SW-18 Coordinate regional approaches and strategic siting of waste management facilities.	x	x	x	x	x	x			x	x	x	x
x			SW-19 State and local governments should facilitate the creation of synergistic linkages between community businesses and the development of eco-industrial parks and materials exchange centers where one entity's waste stream becomes another entity's raw material by making priority funding available for projects that involve co-location of facilities.	x	x	x	x	x	x			x	x	x	x
x			SW-20 Developers and local governments should prioritize siting of new waste management facilities including recycling, composting, and conversion technology facilities in conjunction with existing waste management or material recovery facilities.	x	x	x	x	x	x			x	x	x	x
x			SW-21 Local governments should increase programs to educate the public and increase awareness of reuse, recycling, and composting benefits and raise consumer education issues		x	x	x	x	x	x		x	x	x	x

IGR/Best Practices	Legislation	Coordination	Constrained Policies	Potential for Direct/Indirect Benefits									Other Benefits		
				Land Use and Housing	Transportation	Air Quality	Water	Energy	Open Space and Habitat	Economy	Security and Emergency Preparedness	Solid Waste	Public Health	Environmental Justice	Climate Change
			at the County and City level, as well as at local school districts and education facilities.												
State and Federal Government Policies															
	x		SW-22 CIWMB should increase waste diversion incentives to promote waste diversion past the current 50% diversion mandate of AB939.	x	x	x	x	x	x	x		x	x	x	x
	x		SW-23 The State and Federal governments should develop and implement new and existing legislation that requires recycled content procurement programs, favoring the purchase of recycled and recyclable products or products with built-in EPR design in all state and federal agencies.		x	x	x	x	x	x		x	x	x	x
	x		SW-24 Federal and State governments should explore financial incentives such as tax credits, subsidies, and price supports for waste diversion activities that include waste reduction, recycling, composting, and conversion technologies.		x	x	x	x	x	x		x	x	x	x
		x	SW-25 CIWMB, Air Resources Board, and the California Water Resources Board should coordinate to address regulatory challenges and streamline the permitting process for solid waste conversion and composting technologies.	x	x	?	?	?	?			x			x

IGR/Best Practices	Legislation	Coordination	Constrained Policies	Potential for Direct/Indirect Benefits									Other Benefits		
				Land Use and Housing	Transportation	Air Quality	Water	Energy	Open Space and Habitat	Economy	Security and Emergency Preparedness	Solid Waste	Public Health	Environmental Justice	Climate Change
	x		SW-26 The Federal government and CIWMB should establish policies that provide (a) diversion credit for beneficial use of *post-recycled*, solid waste residuals managed at non-burn conversion technology facilities, and (b) separate and remove conversion technologies from the definition of "transformation."			?	?	?	?			x	x	x	x
	x		SW-27 Federal, State, and local governments should support and encourage federal and state incentives for the research and development of pilot or demonstration projects for solid waste conversion technologies.			?	?	?	?			x			x
		x	SW-28 CIWMB should do the following to improve education and awareness of solid waste management issues: (1) actively promote education regarding reuse, recycling, composting and solid waste conversion technology programs; (2) provide information concerning the costs and benefits of these programs to local governments; and (3) facilitate state and local government coordination of consumer awareness programs to minimize unnecessary duplication of effort in solid waste outreach programs carried out by local government.		x	x	x	x	x		x	x	x	x

IGR/Best Practices	Legislation	Coordination	Constrained Policies	Potential for Direct/Indirect Benefits									Other Benefits		
				Land Use and Housing	Transportation	Air Quality	Water	Energy	Open Space and Habitat	Economy	Security and Emergency Preparedness	Solid Waste	Public Health	Environmental Justice	Climate Change
	x		SW-29 The Federal government should provide funding and support for continuation of public education programs on waste management issues.		x	x	x	x	x	x		x	x	x	x

IGR/Best Practices	Legislation	Coordination	Strategic Initiatives	Potential for Direct/Indirect Benefits									Other Benefits		
				Land Use and Housing	Transportation	Air Quality	Water	Energy	Open Space and Habitat	Economy	Security and Emergency Preparedness	Solid Waste	Public Health	Environmental Justice	Climate Change
State and Federal Government Initiatives															
	x		SWSI-1 Federal, State and local governments should support and implement source reduction policies which promote product stewardship through the following actions: • Support and encourage Federal and State legislation that create incentives for participation in Extended Producer Responsibility such as, encouraging public-private partnerships with product stewardship goals (e.g. The European Green Dot system) and offering incentives to producers who use recycled content to encourage growth in the recycled contents market. • Create ordinances with extended producer responsibility (EPR) policies that require producers and manufacturers to produce "sustainable" packaging and products, develop life cycle assessments for products, as well as, support the development of infrastructure and markets for the recycling and reuse of these products. EPR principles that should be included are: increasing the useful life of products through durability and		x	x	x	x	x	x		x	x		x

IGR/Best Practices	Legislation	Coordination	Strategic Initiatives	Potential for Direct/Indirect Benefits									Other Benefits		
				Land Use and Housing	Transportation	Air Quality	Water	Energy	Open Space and Habitat	Economy	Security and Emergency Preparedness	Solid Waste	Public Health	Environmental Justice	Climate Change
			reparability; increasing production efficiency to produce less production waste and less packaging waste; increasing recyclable material content and reducing virgin material content; facilitating material or product reuse; and decreasing of the toxicity of products. Packaging should be easily recyclable or biodegradable based on any number of EPR strategies including, Design for the Environment (DfE) or Design for Disassembly (DfD) principles. For example, businesses such as, takeout food distributors, should utilize packaging that is compatible with recycling and composting options available. • Create ordinances that ban items from landfill disposal (e.g., construction and demolition material) or ban the use of materials that cannot be recycled to prevent the material from entering the waste stream (e.g., styrofoam and other unrecyclable, plastic fast-food packaging).												
	x		SWSI-2 Federal and State and local governments should institute "eco-taxes" and EPR initiatives that require companies to		x	x	x	x	x	x		x	x		x

IGR/Best Practices	Legislation	Coordination	Strategic Initiatives	Potential for Direct/Indirect Benefits									Other Benefits		
				Land Use and Housing	Transportation	Air Quality	Water	Energy	Open Space and Habitat	Economy	Security and Emergency Preparedness	Solid Waste	Public Health	Environmental Justice	Climate Change
			internalize environmental damage costs associated with their products and help companies derive profit from resource efficiency. These would include the following actions: • Institute Pay As You Throw (PAYT) trash disposal systems. • Identify and alter tax policies that enhance polluting industries and products at the expense of more environmentally benign systems and goods such as, shifting taxes from income and labor ("goods") to resource depletion, wasting, and polluting activities ("bads") and ending government subsidies that promote virgin materials extraction, processing, and manufacturing activities. • Add a packaging tax with rates based on the environmental impacts of different packaging materials (based on Danish system); require that companies take back certain types of packaging for reuse or recycling; or add a levy, quota, or ban on one-way beverage containers or require the use of refillable beverage containers only.											

[1] California Integrated Waste Management Board. Annual Summary Report: Waste Flow by Origin. Multi-year Countywide Origin Summary. Data retrieved (June 2007) from http://www.ciwmb.ca.gov/LGCentral/DRS/Reports/Orgin/WFOrginAnnual.asp .
[2] California Integrated Waste Management Board. June 2007. Estimated Residential Disposal Rates. http://www.ciwmb.ca.gov/LGCentral/Rates/Disposal/Resident.htm.
[3] California Integrated Waste Management Board. June 2007. Estimated Non-Residential Disposal Rates. http://www.ciwmb.ca.gov/LGCentral/Rates/Disposal/NonResid.htm.
[4] Environmental Protection Agency. 1995. Decision Maker's Guide to Solid Waste Management, Volume II. Washington DC.: U.S. EPA Office of Solid Waste.
[5] Walsh, P. and P. O'Leary. 2002. Evaluating a Potential Sanitary Landfill Site. Waste Age. May 2002:74-83.
[6] Walsh, P. and O'Leary, P. 2002. Evaluating a Potential Sanitary Landfill Site. *Waste Age* May 2002: 74-83.
[7] Fishbein, B., Ehrenfield, J. and J. Young. 2000. Extended Producer Responsibility: A Materials Policy for the 21st Century. New York: INFORM, Inc.
[8] Schandl, H. and N. Eisenmerger. 2006. Regional Patterns in Global Resource Extraction. *Journal of Industrial Ecology* 10(4):133-147.
[9] Ibid.
[10] Leachate is a concentrated chemical soup produced as water percolates through decomposing garbage in a landfill. Toxic chemicals are produced or leached from the decomposition of both toxic and non-toxic trash.
[11] Lee, G. F. and Jones-Lee, A. 2007. Flawed Technology of Subtitle D Landfilling of Municipal Solid Waste. Report of G. Fred Lee & Associates, El Macero, CA. Initial report -- December (2004) updated February (2007).
[12] Agency for Toxic Substances and Disease Registry. 2001. Landfill Gas Primer: An Overview for Environmental Health Professionals. Atlanta, GA. http://www.atsdr.cdc.gov/HAC/landfill/html/intro.html
[13] Lee, G. F. and Jones-Lee, A. 1994. Impact of Municipal and Industrial Non-Hazardous Waste Landfills on Public Health and the Environment: An Overview.
[14] Sanitation Districts of Los Angeles County. 2007. Waste-By-Rail. http://www.lacsd.org/info/waste_by_rail/default.asp
[15] California Integrated Waste Management Board. 1997. Waste Board Approves Permit for Regional Landfill in Imperial County. Notice 97-031. http://www.ciwmb.ca.gov/PressRoom/1997/mar/NR031.HTM
[16] Sanitation Districts of Los Angeles County. 2006. Mesquite Regional Landfill Fact Sheet. http://www.lacsd.org/info/waste_by_rail/fact_sheets.asp
[17] California Integrated Waste Management Board. 2007. County Waste Flow Information: California Counties Disposal Destination Data. http://www.ciwmb.ca.gov/LGCentral/Summaries/CountyInfo.asp
[18] Public Resources Code (PRC), Section 41780.
[19] Diversion is generally defined as the reduction or elimination of the amount of solid waste from solid waste disposal (to landfill or incineration). Source reduction (waste prevention), recycling, reuse, and composting activities are considered diversion.
[20] California Integrated Waste Management Board. 2007. Waste Stream Information Profiles http://www.ciwmb.ca.gov/Profiles/.
[21] National Recycling Coalition. 2001. California Recycling Economic Study. Prepared for the California Integrated Waste Management Board.
[22] Environmental Protection Agency. 1998. Puzzled About Recycling's Value? Look Beyond the Bin. EPA530-K-97-008. http://www.epa.gov/msw/recpubs.htm.

[23] Tellus Institute. 1994. Energy Implications of Integrated Solid Waste Management Systems. Prepared for The New York State Energy Research and Development Authority. Energy Authority Report 94-11. Boston, MA.
[24] Martchek, K. 2006. Modelling More Sustainable Aluminum: A Case Study. *International Journal of Life Cycle Assessment* 11(1): 34-37.

[25] California Integrated Waste Management Board. 2004. Statewide Waste Characterization Study. (Publication # 340-04-005).
[26] Alameda County Waste Management Authority. 2006. 2006 Builders Guide to Reuse and Recycling: A Directory for Construction & Demolition Landscaping Materials. http://stopwaste.org/docs/buildersguide-05.pdf.
[27] City of Santa Monica. 2006. Santa Monica Sustainable City Program.
[28] California Integrated Waste Management Board. 2007. "Food Scrap Management." http://www.ciwmb.ca.gov/FoodWaste/
[29] California Integrated Waste Management Board. 2004. Evaluation of Conversion Technology Products.
[30] California Integrated Waste Management Board. 2005. Conversion technologies report to the legislature. (Publication # 442-05-016).
[31] California Integrated Waste Management Board. 2005. Conversion technologies report to the legislature. (Publication # 442-05-016).
[32] Defra, 2005. Advanced Thermal Treatment of Municipal Solid Waste. Waste Implementation Programme New Technologies.
[33] California Integrated Waste Management Board. 2004. Evaluation of Conversion Technology Products.
[34] URS. 2005. Conversion Technology Evaluation Report. Prepared for The County of Los Angeles Department of Public works.
[35] Zero Waste New Zealand Trust, 2003. Getting There! The Road to Zero Waste. Aukland: Envision New Zealand, Ltd.; Zero Waste International Alliance, 2007
[36] Also referred to as Life Cycle Analysis
[37] Chelsea Center for Recycling and Economic Development. N.d. Assessing the flow of materials in a region: lessons learned from three Massachusetts communities.
[38] Lindhqvist, T. Extended Producer Responsibility in Cleaner Production. Lund University. The International Institute of Environmental Economics.